



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/040,027	10/25/2001	Paul Robert Hoffman	G0052	8885
7590	09/22/2004		EXAMINER	
Serge J. Hodgson Gunnison, McKay & Hodgson, L.L.P. 1900 Garden Road, Suite 220 Monterey, CA 93940				ZARNEKE, DAVID A
		ART UNIT	PAPER NUMBER	2829

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/040,027	HOFFMAN, PAUL ROBERT	
	Examiner	Art Unit	
	David A. Zarneke	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 28 June 2004.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-10, 13, 14 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-10, 13, 14 and 21-25 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 28 June 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 6/28/04 have been fully considered but they are not persuasive.

Applicant requested art that teaches that beads formed around the periphery of chips is conventionally known in the art and that the height of the sensor relative to the rear surface of the substrate is a matter of design choice be provided to support these contentions.

The examiner supplies as art Lee, US Patent 5,986,334, and Hirataka et al., US Patent 5,675,684, in support of the contentions made in the previous office action.

Lee (figures 7A & B) teaches a bead (50) that forms a bead around the periphery of chip.

Regarding the chip being coplanar with the substrate, Lee (figures 7A&B) teaches the chip as being coplanar with the substrate. Lee also teaches other embodiments wherein the chip is below the substrate surface. This leads one of ordinary skill in the art to believe that one can make the chip to any height as a mere matter of design choice.

Further, Hirataka (figures 6 & 7) teaches a chip that is either coplanar or below the substrate (figure 6) and a chip that is above the substrate (figure 7). As noted above, this would lead one of ordinary skill in the art to believe that the height of the chip relative to the height of the substrate is a mere matter of design choice.

Therefore, pending claims 1-10, 13, 14 and 21-25 are rejected as below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-8, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gramann et al., US Patent 5,907,151, in view of Lee, US Patent 5,986,334.

Gramann teaches an image sensor package comprising:
a transparent substrate (7) comprising a base surface (9) and a pocket sidewall (10 & 11);
a trace coupled to said base surface (12);
an image sensor (1) comprising a first surface comprising an active area (6) and a bond pad (22); and

a bump (5, 54+) coupling said bond pad to said trace, wherein said image sensor is located within an image sensor pocket of said transparent substrate defined by said base surface and said pocket sidewall (Figure 1).

Gramann fails to teach a bead forming a seal between a periphery of said image sensor and said base surface, wherein said image sensor, said bead, and said base surface define a cavity, said active area being located within said cavity.

Lee (figure 7A) teaches the use of a bead (50) forming a seal between a periphery of said image sensor (10) and said base surface (20), wherein said image sensor, said bead, and said base surface define a cavity, said active area being located within said cavity.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the bead of Lee in the invention of Gramann because Lee teaches the use of a bead as opposed to or along with a bump is conventionally known in the art (11, 38+). The use of conventional materials to perform there known functions in a conventional process is obvious (MPEP 2144.07).

Regarding claim 2, Gramann teaches said transparent substrate further comprises a rear surface (24 & 25), said pocket sidewall extending between said base surface and said rear surface, wherein said trace extends from said base surface, along said pocket sidewall, and to said rear surface (figure 1).

With respect to claim 3, Gramann teaches said trace comprises a first portion extending along said base surface to said pocket sidewall; a second portion extending

along said pocket sidewall from said base surface to said rear surface; and a third portion extending along said rear surface (figure 1).

As to claim 4, Gramann teaches said first portion, said second portion, and said third portion are integral (figure 1).

Regarding claim 5, while Gramann fails to teach coupling a ball to the third portion, it would have been obvious to one of ordinary skill in the art at the time of the invention to couple a ball to the third portion because attaching balls to terminals is conventionally known in the art. The use of conventional materials to perform there known functions in a conventional process is obvious (*In re Aller* 220 F.2d 454,456,105 USPQ 233,235 (CCPA 1955)).

With respect to claim 6, while Gramann fails to teach coupling a pad to the third portion, it would have been obvious to one of ordinary skill in the art at the time of the invention to couple a pad to the third portion because attaching pads to terminals is conventionally known in the art. The use of conventional materials to perform there known functions in a conventional process is obvious (*In re Aller* 220 F.2d 454,456,105 USPQ 233,235 (CCPA 1955)).

In re claim 7, Gramann teaches said image sensor is entirely within said image sensor pocket (figure 1).

Regarding claim 8, Gramann teaches said image sensor comprises a second surface below said rear surface of said transparent substrate (figure 1).

With respect to claim 13, Gramann teaches an underfill (29) filling a region between said first surface of said image sensor and said base surface (figure 1).

As to claim 14, Gramann teaches the underfill contacts and protects said active area (figure 1).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gramann et al., US Patent 5,907,151, in view of Lee, US Patent 5,986,334.

Gramann teaches an image sensor package comprising:

a transparent substrate (7) comprising:

a base surface (9);

a pocket sidewall(10 & 11); and

a rear surface, said pocket sidewall extending between said base surface and said rear surface;

a trace (12) coupled to said base surface, wherein said trace extends from said base surface, along said pocket sidewall, and to said rear surface;

an image sensor (1) comprising:

a first surface comprising an active area (6) and a bond pad (22); and

a bump (5, 54+) coupling said bond pad to said trace, wherein said image sensor is located within an image sensor pocket of said transparent substrate defined by said base surface and said pocket sidewall (figure 1).

While Gramann teaches the second surface of the sensor to be formed below the rear surface of the transparent substrate, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the second surface coplanar with the rear surface of said transparent substrate because, barring a showing of unexpected results, the location of the sensor in the package is a mere matter of design choice.

This is confirmed by Lee (figures), which teaches various embodiments wherein the chip is below the substrate surface and coplanar with the substrate surface.

Therefore, as noted in the previous office action, design choices and changes of size are generally recognized as being within the level of ordinary skill in the art (MPEP 2144.04(d)).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gramann et al., US Patent 5,907,151, in view of Lee, US Patent 5,986,334, as applied to claim 1 above, and further in view of Hirataka, US Patent 5,675,684.

Gramann teaches an image sensor package comprising:

a transparent substrate (7) comprising:

a base surface (9);

a pocket sidewall(10 & 11); and

a rear surface, said pocket sidewall extending between said base surface and said rear surface;

a trace (12) coupled to said base surface, wherein said trace extends from said base surface, along said pocket sidewall, and to said rear surface;

an image sensor (1) comprising:

a first surface comprising an active area (6) and a bond pad (22); and

a bump (5, 54+) coupling said bond pad to said trace, wherein said image sensor is located within an image sensor pocket of said transparent substrate defined by said base surface and said pocket sidewall (figure 1).

While Gramann teaches the second surface of the sensor to be formed below the rear surface of the transparent substrate, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the second surface above the rear surface of said transparent substrate because, barring a showing of unexpected results, the location of the sensor in the package is a mere matter of design choice. This is confirmed by Hirataka (figures 6 & 7), which teaches various embodiments wherein the chip is below or coplanar with the substrate surface and above the substrate surface.

Therefore, as noted in the previous office action, design choices and changes of size are generally recognized as being within the level of ordinary skill in the art (MPEP 2144.04(d)).

Claims 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gramann et al., US Patent 5,907,151, in view of Lee et al., US Patent 5,986,334.

Gramann teaches an image sensor package comprising:

a transparent substrate (7) comprising a base surface (9) and a pocket sidewall (10 & 11);

a trace coupled to said base surface (12);

an image sensor (1) comprising a first surface comprising an active area (6) and a bond pad (22); and

a bump (5, 54+) coupling said bond pad to said trace, wherein said image sensor is located within an image sensor pocket of said transparent substrate defined by said base surface and said pocket sidewall (Figure 1).

Gramann fails to teach the base and the pocket sidewall being two separate pieces coupled together.

Lee (figure 6) teaches a semiconductor package comprising:
a substrate comprising:
a base (60);
a pocket ring (20) coupled to said base; and
a chip (10) comprising a first surface comprising an active area and a bond pad (11), wherein said chip is located within a chip pocket of said substrate.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the two piece substrate of Lee in the invention of Gramann because Lee teaches the equivalence between a two substrate (figure 6) and a one piece substrate (figure 1).

The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950)).

Further, Gramann fails to teach a bead forming a seal between a periphery of said image sensor and said base surface, wherein said image sensor, said bead, and said base surface define a cavity, said active area being located within said cavity.

Lee (figure 7A) teaches the use of a bead (50) forming a seal between a periphery of said image sensor (10) and said base surface (20), wherein said image

sensor, said bead, and said base surface define a cavity, said active area being located within said cavity.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the bead of Lee in the invention of Gramann because Lee teaches the use of a bead as opposed to or along with a bump is conventionally known in the art (11, 38+). The use of conventional materials to perform there known functions in a conventional process is obvious (MPEP 2144.07).

Regarding claims 22 and 23, while Gramann appears to only teach a square base and pocket ring (figures 1B, 8A & 8D), barring a showing of unexpected results, changes of size or shape are within the ordinary level of skill in the art. Design choices and changes of size or shape are generally recognized as being within the level of ordinary skill in the art (MPEP 2144.04(d)).

With respect to claims 24 and 25, while Lee only teaches in passing the bonding of the base and the pocket ring (10, 20+), the use of glue to bond them together (claim 24) or laminating them together (claim 25) are both conventionally known in the art methods of bonding two pieces together. The use of conventional materials to perform there known functions in a conventional process is obvious (*In re Aller* 220 F.2d 454,456,105 USPQ 233,235 (CCPA 1955)).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-F 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Tokar can be reached on (571)-272-1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David A. Zarncke
Primary Examiner
September 9, 2004